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Undergrounding

**The
growing trend
in electric
distribution line
installation**

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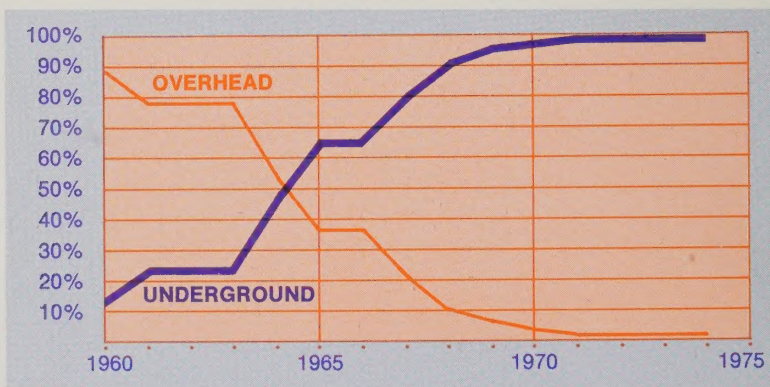
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NEW HOMES SERVED BY DWP



Trend Growing to Install Utility Lines Underground



The increasing desire of people to improve the beauty of their environment has advanced the growing trend among electric and other utilities toward the installation of utility lines underground, and Los Angeles is among the leading U.S. cities in bringing about the transformation from overhead to underground electric distribution lines.

The Los Angeles Department of Water and Power is participating actively in this beautification movement by



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encouraging the installation of underground lines wherever feasible and consistent with its policy of providing reliable electric service to its customers at low cost.

An expanding program has been launched by the DWP in Los Angeles to bring about the change from overhead to underground distribution in an orderly way and as rapidly as working arrangements and financing will permit. Under this program emphasis is placed on three aspects of underground installation: 1. Power lines are being installed underground in new tracts as they are developed. 2. Existing overhead lines are being replaced by underground in a planned program. 3. Provision is made for replacing existing overhead lines at property owners' expense upon their request.

The program for undergrounding power lines is planned on a basis designed to be fair to all rate payers wherever they live in Los Angeles. There are 6,194 miles of existing overhead pole lines in the City. It is impossible to put all of them underground at once. The estimated cost to replace all of these pole lines with underground facilities would be prohibitively high, approximately \$2.5 billion to the Department of Water and Power, with an additional cost of \$0.8 billion to other City departments and public agencies, and property owners, for a total cost of \$3.3 billion. This would require a very large increase in electric rates.

The principle is kept in mind that in general, those who will directly benefit from the placement of power lines underground should bear a major portion of the extra cost of the underground facilities. Thus, an unfair financial burden is not placed on rate payers living in other areas of the City who will not benefit.

Guided by this and other general principles, the DWP is encouraging the transition from overhead to underground



distribution of power by investing an increasing amount of money every year for this purpose.

This process of undergrounding existing power lines in the City will take many years and involve large expenditures, but it will make an important contribution to the goal desired by so many citizens who wish for a more beautiful Los Angeles.

Notes of Historical Interest About Undergrounding



Underground electric distribution is not new to Los Angeles. In fact, the DWP placed its first below-surface power cable in the Harbor district of the City in 1921.

The first area in the City in which the change from overhead to underground distribution was undertaken as a major project was the Los Angeles downtown district, beginning in the early 1920's. The high load density and rapidly growing demand for power in this concentrated area made an underground system a practical and economic necessity. During this same period, several residential subdivisions in the western part of the City obtained underground electric services because the developers paid the difference between lower cost overhead lines and higher cost underground installations.

Because of the higher costs associated with underground installations, which ranged up to ten times as much as for comparable overhead installations, the widespread



development of underground power lines in Los Angeles did not begin until the mid-50's.

In 1954, the DWP provided a budget of \$3.7 million for installing underground distribution lines. By 1960, this amount had increased to \$4.6 million. Since then, the Department budget for underground power line installation has risen to a projected \$22 million in 1974-75, and this sum is expected to increase further in the future.

Two factors have made this expanding program possible. The first is the increasing desire of Los Angeles citizens to improve the beauty of their environment; the second is that recent technical breakthroughs by manufacturers in design and materials have reduced costs as much as 60 percent in some instances.

Support for undergrounding power lines has also come from the Mayor and the City Council of Los Angeles. In February, 1966, the City adopted an ordinance requiring the installation of underground lines within new residential and commercial subdivisions.

In 1967, the California Public Utilities Commission recognized the changing trend toward undergrounding by establishing new rules for undergrounding electrical and communication lines for utilities under their jurisdiction. Of course, it is both physically and financially impossible for electric utilities to place all overhead facilities underground immediately.

However, the DWP anticipates that steady advances in undergrounding techniques will continue to be made, which will allow the Department to continue to expand the underground program and still maintain its policy of providing reliable, low-cost electric service to its customers.



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Undergrounding Power Lines in New Subdivisions



An ordinance adopted on February 10, 1966, amending section 17.05 of the Los Angeles Municipal Code requires underground distribution in new subdivisions and tracts. This ordinance provides:

- a. *In new subdivisions within areas that are zoned as Agricultural (A), Residential (R), or Commercial (C), utility lines required for electric service, communication, street lighting and all other similar utility lines necessary for the general use of the lot owners of the subdivisions shall be installed underground.*
- b. *The subdivider is responsible for making the necessary arrangements with the utility companies for the installation of such facilities. The utility lines shall be installed so as not to interfere with other underground utilities.*
- c. *The Advisory Agency, consisting of the City Planning Director and his deputies, after recommendation of other concerned Los Angeles City departments and officials, and in the exercise of sound reasonable judgment may waive all or a part of the requirements of this subsection if it is determined that soil, topographical, or any other conditions make such installation unreasonable or impractical.*
- d. *Only those utility lines providing direct service to the area being subdivided are covered by the ordinance.*

To obtain underground electric service for a subdivision, the developer normally constructs the conduit system in accordance with plans furnished by the DWP. The DWP then installs all cables, transformers, and other electrical equipment.



This expenditure by the DWP is equivalent to the amount it would normally spend to install an overhead service system in the subdivision.

In a typical new subdivision, the cost of conduit, cable and transformers might average \$715 per lot. Of this total, \$300 would be paid by the developer for the conduit, while the DWP would pay the costs of the cable and transformers. It should be stressed, however, that these are only typical costs and subject to considerable variation.

Replacing Existing Overhead Lines Under a Planned Program



The Department of Water and Power participates in a program to replace existing overhead distribution lines with underground facilities along major thoroughfares, along streets in civic or public recreation areas, adjacent to airports, and at such places where the improved appearance of streets would be of benefit to the City as a whole.

The planned replacement of overhead lines with underground lines is implemented through the creation of Underground Utility Districts as provided by Ordinance No. 145,148 enacted October 12, 1973. Under this ordinance, a Technical Advisory Committee, composed of representatives of the City Engineer, Department of Water and Power, Department of Public Utilities and Transportation and the

The photograph below shows a portion of a Los Angeles residential street before removal of overhead power lines. The photograph on the facing page shows how the appearance of the street has been improved by the installation of underground cable replacing overhead lines.



affected communication utilities, report to the City Council annually a recommended orderly program for the creation of Underground Districts where existing overhead lines will be converted to underground.

Within 15 days after the final resolution creating the Underground Utility Districts is approved by the City Council, the City Clerk will notify all affected utilities and all persons owning property within the district. The Utilities will then make arrangements to provide all the underground distribution facilities on public property necessary to replace the



overhead lines with underground. In turn, property owners shall provide all necessary facility changes on their premises so as to receive such service from the lines of the supplying utility at the new locations.

The program recommended by the Technical Advisory Committee consists of projects nearly equally divided between Street Improvement and Beautification Conversion projects. An annual review is made of all Street Improvement projects included in the Bureau of Engineering's five-year Street Improvement plans and a number of the major thoroughfares scheduled to be fully improved are selected and are recommended by the Technical Advisory Committee for approval. Similarly, a review is made of already fully improved major thoroughfares for Beautification Conversion projects.

The overhead power lines shown in the photograph on the facing page have been replaced by underground cable in this more attractive view of the same residential street in Los Angeles.





A number of these are selected by the Technical Advisory Committee to be recommended for conversion, taking into consideration the total benefits to the citizens of Los Angeles as a whole.

For both Street Improvement and Beautification projects, the selection of the streets to be converted is based on criteria in compliance with the rules and regulations of all the supplying utilities. These criteria are based on such factors as unusually heavy concentration of overhead distribution facilities, volume of pedestrian and vehicular traffic, and whether the area is of civic, recreational, or unusual scenic interest to the general public.

This program is moving ahead as rapidly as funds and manpower allow, without financial burden to Los Angeles citizens.

Extending Distribution Lines in Existing Areas



Under the DWP policy, essentially no new overhead power distribution lines over 500 feet in length are being built on Los Angeles residential or commercial streets where full width street improvements and ornamental street lights have been installed. The policy requires that such new lines be placed underground.



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Replacing Existing Overhead Lines at Property Owners' Expense Upon Their Request



When residents of a neighborhood request replacement of overhead distribution lines by underground facilities, replacement can be made at the property owners' expense by either of two methods:

1. Neighborhood property owners can obtain informal cost range estimates from the DWP in connection with converting their particular area to underground. If agreement is reached among all the property owners in the area, and an engineering deposit is submitted to the DWP, precise work and cost studies will then be prepared. Arrangements can be made for the property owners to make direct payment to the DWP to cover their portion of the cost of removal of existing overhead lines, or the owners may have their own contractors do a part of the work in lieu of payment to the DWP.

If the area to be undergrounded includes the removal of all overhead facilities from both sides of the street for at least one block or 600 feet, the DWP will share in the cost of replacing the overhead with underground distribution facilities. In this case, if the property owners agree to bear the expense of the conduit system and of all substructures required, the Department will provide the underground cable, transformers, switches, etc., and remove the overhead pole line at its expense.

If the area to be undergrounded is less than one block or 600 feet, the property owners must pay the Department the difference between the estimated cost of completing the underground system and the estimated

DWP policy encourages installation of underground electric facilities wherever practical, and in accordance with the overall policy of supplying dependable electric service at low rates.



cost of installing a new equivalent overhead system plus the estimated cost of the unused life of the existing overhead system.

2. As an alternative to direct payment of costs by the property owners, a petition can be circulated in a neighborhood to form an assessment district to finance the costs of conversion from overhead to underground lines. At least 20 neighborhood property owners' signatures are required on the petition. Petition forms may be secured from any District Engineer's Office of the Los Angeles City Department of Public Works. A study will be made to determine the costs of the changeover; then the matter will be submitted to the Los Angeles City Council for the final decision

as to the creation of the district. If approved, the assessment district will be established, and the costs will be paid for over a 10-year period by assessments billed directly to the local property owners or added to their individual property taxes. The length of time required under this method to obtain the underground installation is at least two years.

The following is an example of typical costs on a per-lot basis:

	By DWP	By Property Owners
Conduit system that is on public property		\$1000
Conduit that is on customer's property. (Not averaged, each customer pays his own; a typical amount is here shown)		300
Cable on public property	\$300*	
Transformers	200	
Cable on private property	100*	
Removal of overhead facilities, plus unused life, less salvage	375	
	\$975	\$1300

**In some cases property owners pay part in accordance with the Department's service rules.*

In addition to the above, there may be costs for changing telephone and street lighting facilities from overhead to underground, as well as for other utilities which may be using the poles for their facilities.

Information on steps to be taken and potential costs in replacing overhead with underground distribution on DWP lines can be obtained from the DWP's Underground Distribution Design Subsection, Telephone: 481-5016.



*Answers to Frequently Asked
Questions About DWP
Underground Installations*

- Q.** *What is the Department's policy on the installation of underground electric distribution facilities?*
- A.** The policy of the Department is to encourage the installation of underground electric facilities wherever practical and economically feasible, and in accordance with the overall policy of supplying dependable electric service to customers at low rates.
- Q.** *What does the DWP spend annually on underground facilities?*
- A.** During the fiscal year 1974-75, the DWP will invest about \$22 million in underground construction. This figure has been increased annually over a period of years. This trend is expected to continue.
- Q.** *Department crews have been seen installing underground facilities in some subdivisions. Is this done for all new home tracts?*
- A.** A Los Angeles City Ordinance requires underground lines to be installed to serve new tracts, unless soil, topographical or other conditions make such installations impractical.
- Q.** *Who pays for the difference between the cost of underground and overhead facilities in a new subdivision?*
- A.** The developer pays the difference.
- Q.** *How is the incremental cost per lot to the developer for new underground utilities determined?*
- A.** This depends upon many factors. They include: (1) the lot frontage, (2) the problems of the terrain, (3) tract layout, and (4) type of soil.
- Q.** *Why are some older areas supplied with underground services while others are not?*
- A.** In some residential areas, the higher cost of underground facilities was paid by the developer. In some commercial areas, it was found to be more practical from the engineering standpoint and more economical to install underground facilities because of heavy power demand requirements.

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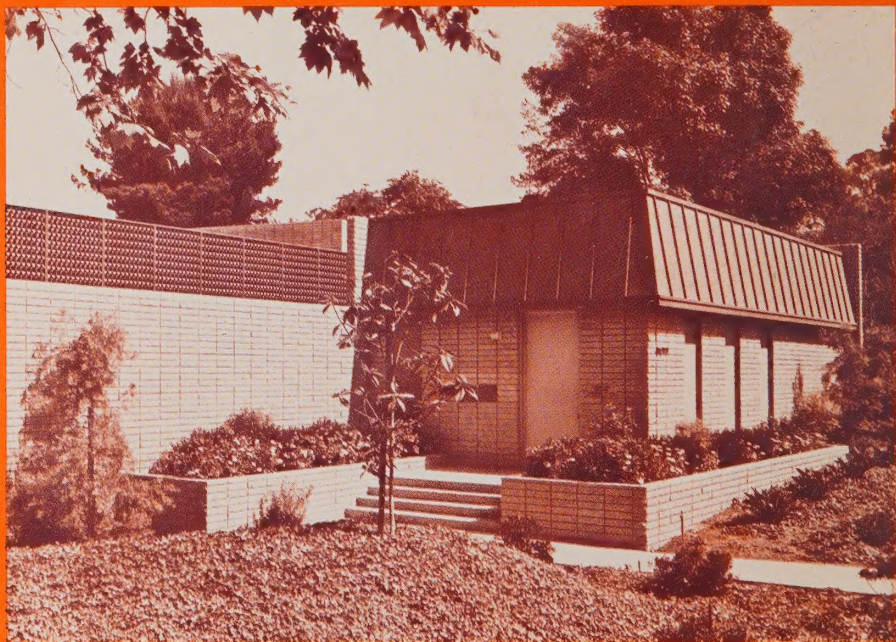
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- Q.** *What methods may property owners utilize to have existing overhead lines removed and replaced with underground lines?*
- A.** There are two methods: (1) the establishment of the area as an assessment district, or (2) a direct payment to the utilities involved to cover the estimated cost of the installation. A pamphlet distributed by the City of Los Angeles, available at Room 807, Los Angeles City Hall, or the City Engineer's District Office, provides details of assessment proceedings.
- Q.** *Does it cost more to install underground than overhead? If so, why couldn't the difference be paid for by increasing electric rates?*
- A.** (1) The cost of underground distribution is from 1½ to 6 times the cost of overhead. (2) If the general electric rate increase were used to absorb the added expense, property owners who still have overhead distribution and will have it for a long time in the future will be subsidizing the installation of underground facilities benefiting property owners elsewhere. This would be discriminatory and unfair.
- Q.** *Could the Department remove all poles from existing overhead areas, then raise power rates so that all residential customers might equally benefit from underground facilities?*
- A.** The Department of Water and Power has some 6,194 miles of overhead distribution lines in Los Angeles. The immediate cost of taking them down and substituting underground lines would be highly prohibitive. The estimated total cost is \$2.5 billion to the DWP ratepayers as a whole plus another \$0.8 billion to property owners, to other City Departments and to public agencies whose electric facilities would be changed from overhead to underground. This would necessitate an unacceptably large increase in rates.
- Q.** *Could you advise me on procedure if I should wish to obtain the installation of underground facilities as a replacement for existing overhead facilities?*
- A.** Proceed as follows: (1) Call the Residential Layout Group of the DWP's Underground Distribution Design Subsection (481-5016) to obtain estimates of the range of costs involved. (2) If the cost range is acceptable, arrange for a preliminary meeting on the job site with a Department of Water and Power representative. A deposit may be required for detailed estimates and design work, the cost being credited to the project upon completion.



Landscaping, low profiles and attractive design of DWP facilities enhance neighborhoods in which they are located. This new electric distributing station is representative of the new architecture.



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